

## A revision of the *Iolaus* (*Argiolaus*) *silas* Westwood complex (Lepidoptera : Lycaenidae) in Southern Africa

by

S. F. HENNING

Department of Entomology, South African Institute for Medical Research, P O Box 1038, Johannesburg 2000, South Africa

and

G. A. HENNING

1 Harry Lawrence Street, Florida Park, Florida 1710, South Africa

*Iolaus* (*Argiolaus*) *silas* Westwood from Southern Africa is revised. *I.(A.) silarus* Druce stat. rev. is considered to be a distinct species and a new subspecies *I.(A) silarus brainei* from South West Africa (Namibia) is described, and notes on its early stages, habits and distribution are given.

The *Iolaus* (*Argiolaus*) *silas* Westwood complex has caused considerable controversy in Southern Africa since Stempffer and Bennett revised the group in 1958.

In this revision Stempffer and Bennett redesignated *Iolaus silarus* Druce as a subspecies of *I. silas* Westwood. They pointed out several important external morphological characters by which *I. silarus* differs from *I. silas*. They also found several differences in the male genitalia. Without justifying why they made *I. silarus* a subspecies of *I. silas*, they go on to say that several *I. silarus*-like specimens had been captured together with *I. silas* at localities in Natal and concluded that the differences between them are variable as they occur in both populations. They appear to ignore the possibility that they are dealing with two species which can occur sympatrically at some localities in Natal.

Having re-examined large numbers of *I. silarus* from Southern and Central Africa and compared them with *I. silas* from the eastern Cape and Natal we conclude that they are distinct species each usually restricted to their preferred habitats. *I. silas* occurs in the moist coastal forest while *I. silarus* is usually found in the drier deciduous woodland.

There are several external morphological differences between *I. silas* and *I. silarus*. The fore wing of male *I. silas* has the outer margin more rounded, the upper side costal and outer marginal black borders are broader than in *I. silarus*. *I. silas* also has the hind wing spots in cells CuA<sub>1</sub> and CuA<sub>2</sub> large and red while those of *I. silarus* are usually much smaller and often black. *I. silas* has the transverse red line on the hind

wing under side curved and irregular and 5 mm from the outer margin at vein  $M_1$ , while in *I. silarus* the line is straight and only 3 mm from the margin at  $M_1$ . The male androconia scales of *I. silas* are oblong whereas *I. silarus* are more angular. In the male genitalia of *I. silas* the valvae (Fig. 23) are elongated and narrow at the base and the juxta (Fig. 26) is narrow basally, while in *I. silarus* the valvae (Fig. 24) are triangular and much broader at the base and the juxta (Fig. 27) is broader basally. These same differences can be seen in the illustrations of male genitalia by Stempffer & Bennett (1958, Fig. 31, for *I. silas* and Fig. 32 for *I. silarus*) and also Stempffer (1967, Fig. 115, for *I. silas*).

The female of *I. silas* also has the costal and outer marginal black border of the fore wing upper side broader than in *I. silarus*. The hind wing upperside of *I. silas* also has a broad reddish-orange submarginal band between veins  $M_1$ -2A, while in *I. silarus* there are only two large reddish-orange spots between veins 2A and  $CuA_1$ . The under sides of the wings show the same differences as in the male. In the female genitalia the papillae anales of *I. silarus* (Fig. 31) are twice the size of *I. silas* (Fig. 30). The ostium bursae is broader and narrows to a smaller antrum in *I. silarus*. The ductus bursae of *I. silarus* (Fig. 31) is sclerotized for more than half the length while that of *I. silas* (Fig. 30) is not sclerotized. The corpus bursae of *I. silas* (Fig. 30) is oblong while that of *I. silarus* (Fig. 31) is rounder.

The population of *I. silarus* from South West Africa (Namibia) was found to exhibit constant morphological differences from specimens of other areas of Southern and Central Africa. As this population appears to be geographically isolated from the remaining population in Southern Africa (there are several other distinct subspecies of butterfly from the area) we have decided to describe it as a subspecies of *I. silarus*. It appears that the moist mopane forests in south and south-eastern Angola in the north, the Kalahari sandveld and the Okavango Swamps in the east, and the very dry great Namaqualand area to the south have effectively isolated this part of South West Africa from the rest of Southern and Central Africa.

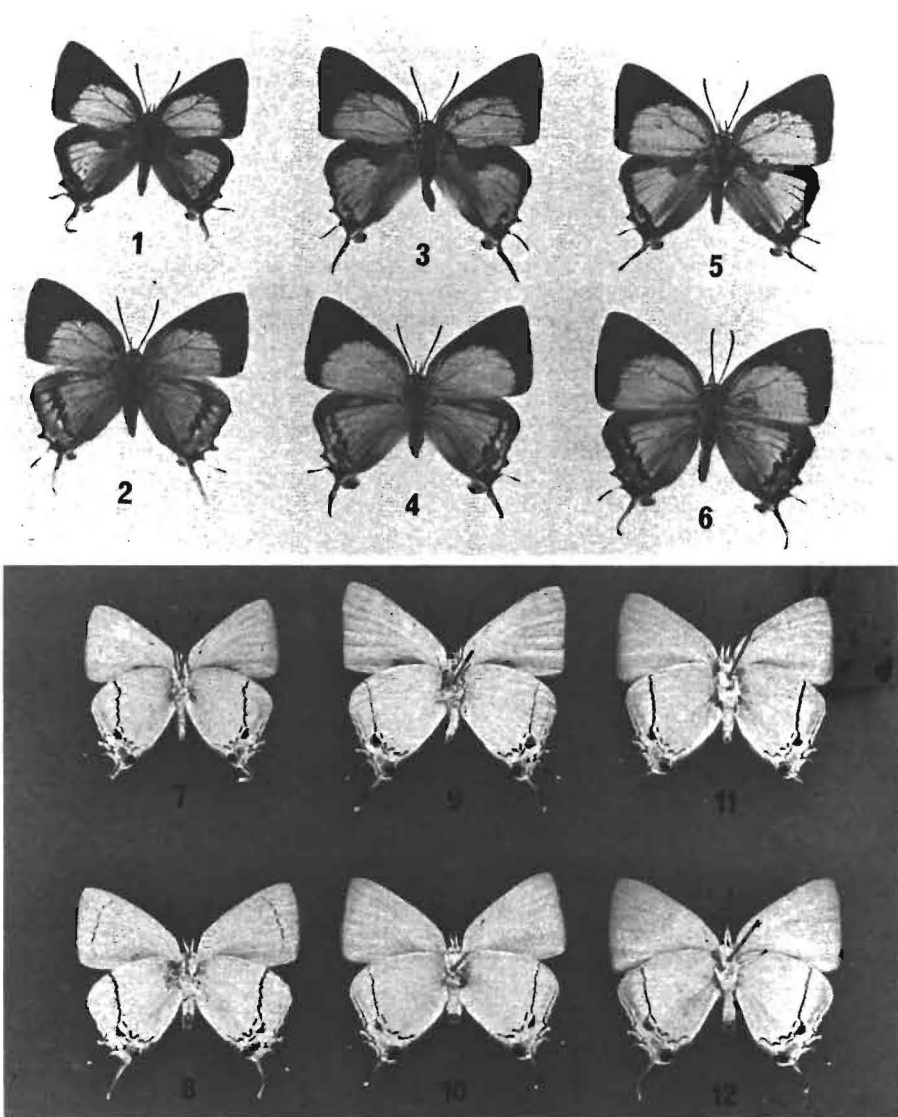
This new subspecies was first brought to our attention by Mr J. Braine in 1973 who found specimens flying commonly at Kombat. Mr I. Bampton visited the area in 1974 and discovered it breeding on the *Loranthus* species found in the area. He left larvae with Mr Braine and showed him where to look for additional specimens. Subsequently Mr Braine bred out a small series of this subspecies. It is mainly from this bred material that the description is made.

The *Iolaus (Argiolaus) silas* Westwood complex is therefore made up of the following 2 species and 1 subspecies.

*Iolaus (Argiolaus) silas* Westwood Figs. 1-2, 7-8, 13, 16, 20, 23, 26, 30.

***Iolaus silas*** Westwood, 1852, *Gen. D. Lep.* p. 481, pl. LXXIV, Fig. 5♀.

**MALE.** Fore wing lengths 17.0-19.5 mm, mean 18.0 mm,  $n = 14$ ; antenna-wing ratios, mean 0.46,  $n = 14$ . *Palpi* (Fig. 13). Second segment long and laterally compressed, white with dark brown scales dorsally at distal end. Third segment white at joint, dark brown dorsally and distally with a blunt tip. *Wings, upper side.* Fore wing metallic pure blue; costal margin, apex (very broadly) and outer margin black; blue colour costally and distally rounded off and covers discal cell, the cells 2A and  $CuA_2$  as far as 2 to 3 mm from margin, about the basal half of cell  $CuA_1$  and a small part of cells  $M_2$  and  $M_3$ . Hind wing blue, at the costal margin as far as the middle of cell Rs and at the outer margin narrowly black, at inner margin as far as vein 2A whitish-grey



Figs. 1-12. *Iolaus (Argiolaus) silas* Westwood and *I. (A.) silarus* Druce subspecies. 1-6. Upper side. 1. *I. (A.) silas* ♂. 2. *I. (A.) silas* ♀. 3. *I. (A.) silarus silarus*, ♂. 4. *I. (A.) silarus silarus*, ♀. 5. *I. (A.) silarus brainei*, ♂ holotype. 6. *I. (A.) silarus brainei*, ♀ paratype. 7-12. Under side. 7. *I. (A.) silas*, ♂. 8. *I. (A.) silas*, ♀. 9. *I. (A.) silarus silarus*, ♂. 10. *I. (A.) silarus silarus*, ♀. 11. *I. (A.) silarus brainei*, ♂ holotype. 12. *I. (A.) silarus brainei*, ♀ paratype. (Photographs by W. J. Morrison).

or blackish-grey; the black marginal line is narrow (about 1 mm) and only expands to a width of 2–3 mm at the apex; anal lobe red speckled with some metallic blue scales, surrounded by white and decorated with short black and longer white scales; in cell  $CuA_2$  and generally also in  $CuA_1$  there is a red submarginal spot more or less surrounded by black; sex-brand yellowish-brown and surrounded by a broad blackish-grey zone covering the greatest part of the discal cell; androconia scales oblong; 3 small tails, that at end of vein  $CuA_1$  short. *Wings, under side.* Fore wing uni-coloured white without markings, or they show a more or less complete reddish-yellow submarginal line. Hind wing white with a fine black postdiscal line in cells 2A to  $CuA_1$  and red in  $M_3$  to  $Sc+R_1$ , a separate red submarginal spot in  $CuA_1$ , a fine, black marginal line and a black anal lobe proximally bordered with red. *Genitalia.* Uncus, two long sharp points separate almost to base; subunci triangular and rudimentary; vinculum broad with partially sclerotized triangular lateral expansions; saccus large and triangular; juxta surrounds aedeagus from a narrow base; valva oblong, narrowing distally; aedeagus short and massive, open dorsally; vesica with stout cornuti.

**FEMALE.** Fore wing lengths 16.5–19.5 mm, mean 18.5 mm,  $n = 17$ ; antenna-wing ratios, mean 0.45,  $n = 17$ . *Palpi.* As in male. *Wings, upper side.* Differs from male in having blue colour less extensive and covered with a grey or whitish-tint; fore wing with black marginal band about 4 mm broad at vein  $CuA_2$ . Hind wing blue colour extends as far as postdiscal area beyond which there is a dark marginal band of 5 mm width, enclosing large, generally united reddish-yellow submarginal spots in cells  $M_1$  to  $CuA_2$ . *Wings, under side.* As in male. *Genitalia* (Fig. 30). Papillae anales evenly rounded on supporting sclerites; apophyses posteriores as long as papillae and supporting sclerites combined; sterigma large and not well sclerotized; ostium bursae broad and flattened with broad antrum; ductus bursae about the same length as ostium and not well sclerotized; corpus bursae oblong with no signa.

**LIFE HISTORY.** This has been described in detail by Clark & Dickson (1971). The recorded foodplants are *Loranthus dredgii* E. & S., *L. elegans* and *Viscum obovatum* Harv. (Loranthaceae).

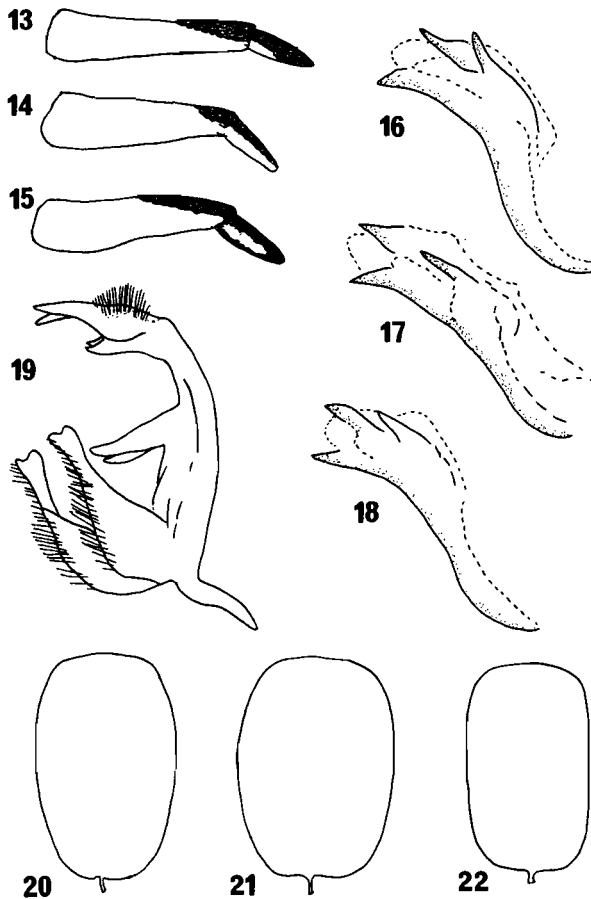
**HABITS.** *I. silas* is an inhabitant of the coastal forest of South Africa. At about 12h00 the males ascend to the highest twigs of trees at the edge of the bush. Here they will establish a territory around a prominent twig and defend it against other males. The resident male will chase all intruding males until they depart, then will frequently return to the same perch. They rest with their wings closed, head downwards, their shiny white undersides often rendering them invisible against the leaves which catch the sun. The females are more often observed ovipositing on *Loranthus* or feeding at flowers.

**DISTRIBUTION.** South Africa in the eastern Cape Province, and Natal as far north as Eshowe.

***Iolaus (Argiolaus) silarus silarus*** Druce stat. rev. Figs. 3–4, 9–10, 14, 17, 21, 24, 27, 31.

***Iolaus silarus*** Druce, 1885, *Ent. Month. Mag.* XXII. p. 154

**MALE.** Fore wing lengths 16.0–20.5 mm, mean 19.5 mm,  $n = 21$ ; antenna-wing ratios, mean 0.46,  $n = 21$ . *Palpi* (Fig. 14). Second segment long and laterally compressed; white with a small patch of brown scales at distal end. Third segment dorsally dark brown, ventrally white, with a blunt tip. *Wings, upper side.* Fore wing lustrous blue; apex, costal and outer margins black. Hind wing blue with the costal margin broadly and outer margin narrowly black; anal lobe carmine with violet scales and a



Figs. 13–22 Palpi, lateral view. 13. *I. (A.) silas*. 14. *I. (A.) silarus silarus*. 15. *I. (A.) silarus brainei*. Aedeagus, cornuti on vesica, lateral view. 16. *I. (A.) silas*. 17. *I. (A.) silarus silarus*. 18. *I. (A.) silarus brainei*. ♂ Genitalia. 19. *I. (A.) silarus brainei*, lateral view. Androconia. 20. *I. (A.) silas*. 21. *I. (A.) silarus silarus*. 22. *I. (A.) silarus brainei*.

black margin; black spot submarginally in cell  $CuA_2$  occasionally enclosing an indistinct red dot; a smaller black dot in  $CuA_1$  also occasionally encloses an indistinct red dot; sex-brand yellowish-brown and surrounded by a broad blackish-grey zone covering the greatest part of the discal cell; androconia scales rectangular; 3 small tails, that at end of vein  $CuA_1$  short. *Wings, under side*. Fore wing uni-coloured white without markings. Hind wing white with a distinct straight, red postdiscal line extending from vein  $Sc+R_1$  to  $CuA_1$  and then continued as a black, interrupted line to vein  $3A$ ; cell  $CuA_1$  with a red submarginal spot; anal lobe violetish-red with a black spot. *Genitalia*.

Similar to *I. silas* but with the following differences: juxta with broader base; valva with broad base and triangular shape; vesica with cornuti slightly different in shape.

**FEMALE.** Fore wing lengths 17,5–21,5 mm, mean 19,5 mm,  $n = 21$ . Antenna-wing ratios, mean 0,44,  $n = 21$ . **Palpi.** As in male. **Wings, upper side.** Fore wing violetish-blue, whitish at base of veins  $CuA_1$  and  $CuA_2$ ; the apex, costal and outer margins blackish grey. Hind wing violetish-blue; blackish-grey costal border broad; black outer marginal border very narrow from anal lobe to vein  $CuA_1$ , then much broader to apex; two crimson submarginal spots in cells  $CuA_1$  and  $CuA_2$ ; there is a narrow black post-discal line from vein  $M_1$  to  $2A$ ; inner fold blackish-grey; anal lobe with a crimson, blue-dusted spot. **Genitalia** (Fig. 31). Similar to *I. silas* but with the following differences: papillae anales twice the size; apophyses posteriores as long as papillae excluding supporting sclerites; ostium bursae broader narrowing to antrum which is smaller; ductus bursae sclerotized along anterior side for over half its length; corpus bursae rounder.

**LIFE HISTORY.** This has been bred on numerous occasions but there do not appear to be any published descriptions. However certain differences have been noted in the first instar larva.

**HABITS.** *I. s. silarus* is an inhabitant of deciduous woodland. The males ascend to the summits of hills where they establish territories around prominent trees. They will select a twig as a perch site and defend it against intruding males. The males on occasion can be observed drinking at damp sand or mud along streams or roads. The females are most frequently observed ovipositing on *Loranthus*.

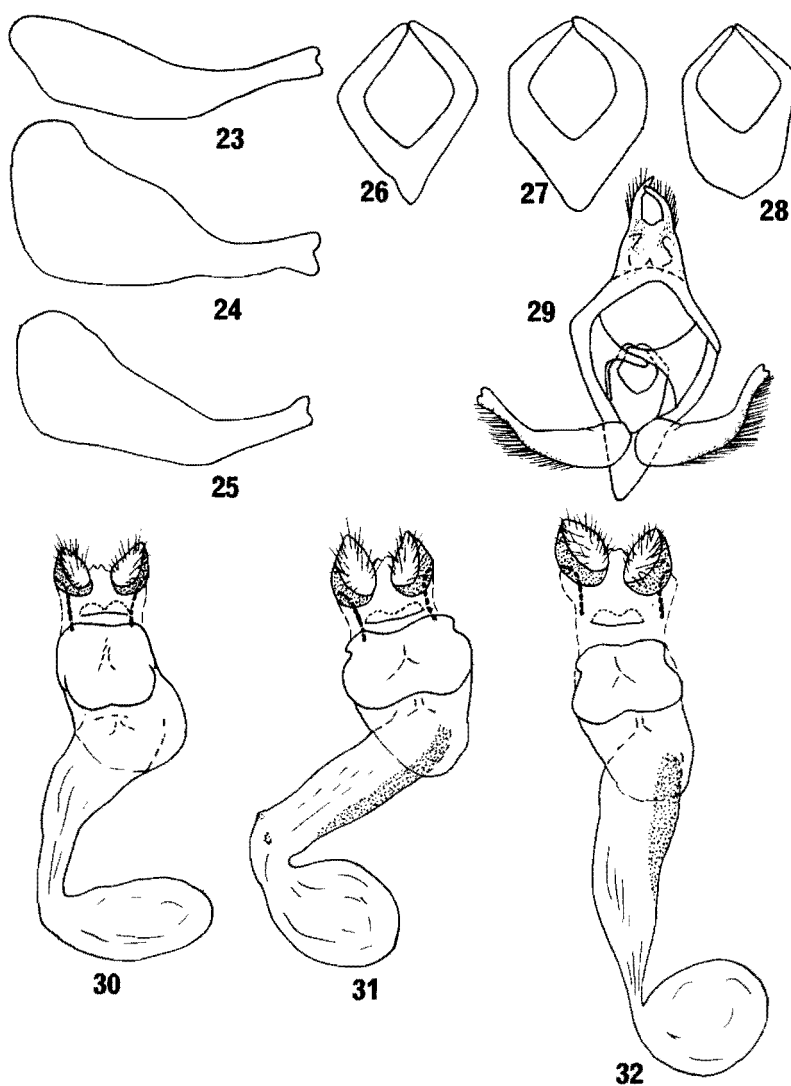
**DISTRIBUTION.** South Africa in Natal and the Transvaal; Botswana; Mozambique; Zimbabwe and Zambia. The type locality is Delagoa Bay, Mozambique.

***Iolais (Argiolaus) silarus brainei*** subsp. nov. Figs. 5–6, 11–12, 15, 18–19, 22, 25, 28, 29, 32.

**MALE.** Similar to *I. s. silarus* but differs in having the black marginal borders of both fore and hind wings slightly broader. The blue area has a greenish tinge which is not so noticeable in either *I. silas* or *I. silarus*. The hind wing spots between veins  $2A$  and  $CuA_1$  are large, red and conspicuous as in *I. silas*. Under side ground colour is more greyish than in *I. s. silarus*. The transverse red line on the hind wing (Fig. 11) is not as bold as in *I. silas* (Fig. 7) and is the same distance (3 mm at vein  $M_1$ ) from the outer margin as *I. s. silarus* (Fig. 9) while in *I. silas* it is more basad being 5 mm from outer margin. **Palpi** (Fig. 15): third segment angled ventrally and slightly more massive than *I. silas* (Fig. 13) and *I. s. silarus* (Fig. 14). **Genitalia:** juxta with very broad base (Fig. 28); valva (Fig. 25) narrower than *I. s. silarus* (Fig. 24) but broader than *I. silas* (Fig. 23); cornuti on vesica (Fig. 18) with a slightly different shape to those of *I. silas* (Fig. 16) and *I. s. silarus* (Fig. 17). **Androconia** scales (Fig. 22) narrowed with a more rectangular shape than in *I. silas* (Fig. 20) and *I. s. silarus* (Fig. 21).

**FEMALE.** Similar to that of *I. s. silarus* with the red spots of the hind wing upper side being restricted to the area between veins  $2A$  and  $CuA_1$ . The variability of the female upper sides of this species precludes any further distinguishing characters. Under side characters as in the male.

**MALE HOLOTYPE.** Fore wing length 19,5 mm; antenna-wing ratio 0,49. **Palpi.** Second segment long, laterally compressed, slightly tilted upwards; covered with closely packed white scales with dark brown scales dorsally at distal end. Third segment with extensive dark brown scales with white scales laterally and a blunt tip. **Wings, upper side.** Fore wing metallic pure blue, with a greenish tinge; blue forming a



Figs. 23-32 Valva, lateral view. 23. *I. (A.) silas*. 24. *I. (A.) silarus silarus*. 25. *I. (A.) silarus brainei*. Juxta, dorsal view. 26. *I. (A.) silas*. 27. *I. (A.) silarus silarus*. 28. *I. (A.) silarus brainei*. ♂ Genitalia. 29. *I. (A.) silarus brainei*. ♀ Genitalia, ventral view. 30. *I. (A.) silas*. 31. *I. (A.) silarus silarus*. 32. *I. (A.) silarus brainei*.

large semicircle, with a moderately wide black border on costa becoming very broad at apex extending down outer margin to tornus; inner marginal tuft of hairs ochre-yellow; cilia grey. Hind wing metallic pure blue, with a greenish tinge; black costal border broad; black outer marginal border very narrow from anal angle to cell  $M_3$ , then much broader to apex; two crimson, blue-dusted spots between veins  $2A$  and  $CuA_1$ ; on anal-angular lobe a crimson, blue-dusted spot; tails black, white-tipped; cilia white. *Wings, under side.* Fore wing immaculate silvery-white becoming greyer at the apex and along the outer margin. Hind wing ground colour silvery-white, greyer along outer margin; a dull, crimson-red transverse postdiscal line bending outwardly forming a red submarginal spot beyond which it is black; a thin broken black line extends from inner margin to vein  $CuA_1$  where it meets the crimson-red line; spot on anal lobe conspicuous, black proximally outlined in crimson-red.

**MALE PARATYPES.** Fore wing lengths 18.5–21.0 mm, mean 19.7 mm,  $n=12$ ; antenna-wing ratios 0.45–0.51, mean 0.47,  $n=12$ . *Genitalia* (Figs. 18–19, 25, 28–29). Similar to *I. s. silarus* but with the following differences: juxta with very broad base; valva much narrower at the base and not as angular in shape; vesica with cornuti slightly different in shape.

**FEMALE PARATYPES.** Fore wing lengths 20.5–23.0 mm, mean 21.6 mm,  $n=17$ ; antenna-wing ratios 0.41–0.45, mean 0.43,  $n=17$ . *Wings, upper side.* Fore wing pale blue, inclining to violet, not metallic, occupying a smaller space than male, so that the dull blackish margins are broader; cilia grey. Hind wing: pale blue inclining to violet, not metallic; costal and outer margin broader than male and dull blackish; postdiscal area with an irregular black line extending from anal fold to costal border; two large reddish-orange submarginal spots between veins  $2A$  and  $CuA_1$ ; anal-angular lobe with a crimson blue-dusted spot; tails black, white-tipped; cilia white. *Wings, upper side.* As in male but with a more distinct submarginal greyish area on hind wing. *Genitalia* (Fig. 32). Ostium bursae narrower and antrum slightly larger than *I. s. silarus*.

**MATERIAL EXAMINED.** ♂ Holotype: SOUTH WEST AFRICA (Namibia), Kombat, bred, emerged 3.v.1974, J. Braine. Paratypes: 2♂, 1♀, same data as holotype; 10♂, 16♀, same data but 2.iv.1973 (1♀), 20.ii.1974 (1♀), 2.iii.1974 (2♀), vi.1974 (1♂, 4♀), vii.1974 (3♂, 2♀), 3.viii.1974 (1♀), 4.viii.1974 (1♀), 23.viii.1974 (1♂), 5.ix.1974 (1♂), 30.iii.1970, S. Braine (2♀), 5.iv.1970, S. Braine (1♀), 16.iii.1971, S. Braine (2♂), 14.iii.1971, S. Braine (1♂, 1♀), i.1974, S. Braine (1♂). The holotype is in the Transvaal Museum, Pretoria; paratypes are in the collections of W. H., S. F. and G. A. Henning, J. and S. Braine and the Transvaal Museum.

**LIFE HISTORY.** *Egg.* Laid singly on leaf of foodplant, white in colour with numerous indentations. Hatches after about 6 days. *Larva.* On emergence, measures just over 1 mm, whitish in colour clothed with long spinous setae. It feeds on the surface of the leaf. At full growth it measures 20 mm, colour green with a reddish-brown dorsal line, smooth without setae, very humped in outline and anal segment bifid. *Pupa.* Length 14 mm, greenish in colour, attached to undersurface of leaf, by cremastral hooks only, in a horizontal position. It remains 3–4 weeks in the pupal stage, sometimes much longer, according to seasonal and temperature changes. *Foodplant.* *Loranthus* sp.

**HABITS.** *I. silarus brainei* is an inhabitant of dry woodland where the most widespread trees are *Acacia* species. The males ascend to the summits of hills where they establish territories and chase off intruding males. They perch on leaves at the top of some tall shrub, thence taking short jerky flights, often returning to the same perch.

The females are usually found at the bottom of hills where they search for suitable *Loranthus* on which to oviposit.

This subspecies has been named after Mr Jack Braine who first brought it to our attention.

**DISTRIBUTION.** South West Africa (Namibia) in the north eastern areas. The type locality is Kombat, South West Africa.

### ACKNOWLEDGEMENTS

Our sincere thanks are due to the following persons who have so willingly assisted during the study: Mr W. H. Henning, Mr I. Bampton, Mr J. Braine, Mr S. Braine, Mr N. K. Owen-Johnston, Dr A. R. Currie and Mr H. C. Ficq.

### REFERENCES

- CLARK, G. C. & DICKSON, C. G. C. 1971. *Life Histories of the South African Lycaenid Butterflies*. Purnell, Cape Town.
- STEMPFER, H. 1967. The genera of the African Lycaenidae (Lepidoptera: Rhopalocera). *Bulletin of the British Museum (Natural History), Entomology* **10**: 1-322.
- STEMPFER, H. & BENNETT, N. 1958. Révision des genres appartenant au groupe des *Iolaus* (Lep. Lycaenidae). *Bulletin de l'Ifan* **XX**: 1244-1347.

Accepted 25 July 1983